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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/911,731	07/25/2001	Tatsuya Kawahara	77661/54	5591

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EXAMINER	
CREPEAU, JONATHAN	
ART UNIT	**PAPER NUMBER**
1746	6

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/911,731	KAWAHARA ET AL.	
	Examin r	Art Unit	
	Jonathan S. Crepeau	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Suggestions

1. In claim 11, "said water repellent layer" in line 1 lacks proper antecedent basis. Appropriate correction is suggested, but not required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 96/24958. Regarding claim 1, the reference is directed to a solid polymer fuel cell (see abstract). The fuel cell includes an electrode comprising a catalyst layer (14) and a diffusion layer (11) (see Figure 1). Regarding claims 1 and 3, the catalyst layer has a structure wherein catalyst-containing zones are alternated in a stepwise manner in a flow direction with non-catalyst-containing zones (see abstract; Figure 3). The upstream (i.e., uncatalyzed) zone prevents drying up of the fuel cell, and the downstream (i.e., catalyzed) zone prevents flooding (see page 5, lines 27-31).

Thus, the instant claims are anticipated.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkinson et al (U.S. Pre-Grant Publication No. 2003/0082432).

Regarding claim 1, the reference teaches a polymer electrolyte fuel cell in paragraphs 4 and 36. The fuel cell includes an electrode (40) comprising a catalyst layer (45) and a substrate (diffusion layer) (42) (see Figure 1). Regarding claims 9 and 10, the porosity (pore amount) and pore size of the substrate increase as the substrate is traversed in-plane in a downstream flow direction (see claims 9 and 10 of the reference). Regarding claims 9, 10 and 11, the substrate may comprise a water repellent layer which may increase or decrease in hydrophobicity as the substrate is traversed in the flow direction (see paragraph 25). Regarding claim 11, the water repellent layer may comprise particulate carbon and PTFE and may change compositionally as the substrate is traversed in the flow direction (see paragraph 25). Regarding claim 6, the upstream structure of the diffusion layer would inherently function to prevent drying of the cell, and the downstream structure of the diffusion layer would inherently function to prevent flooding of the cell. Regarding claims 4 and 5, the loading of the electrocatalyst metal may be varied as the catalyst layer is traversed in-plane (see paragraph 44; claim 18 of the reference).

Regarding claims 2, 3, 7 and 8, the structures of both the catalyst layer and the gas diffusion layer may vary in a step-wise or gradual manner (see Figs. 4a-4c).

While the reference teaches that the loading of the electrocatalyst metal may be varied as the catalyst layer is traversed in-plane, the reference does not expressly teach that the pore size or pore amount in the catalyst layer are varied in-plane, as recited in claims 4 and 5, or that the catalyst layer has a structure whereby the upstream portion prevents drying of the fuel cell and the downstream portion prevents flooding of the fuel cell, as recited in claim 1.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Wilkinson et al. would give the artisan sufficient guidance to ascertain that the pore size and pore amount in the catalyst layer of the reference are varied as the layer is traversed in-plane, as recited in claims 4 and 5. As is known to a skilled artisan, the "catalyst loading" disclosed by the reference refers to the amount (i.e., mass) of catalyst per unit area of surface. Since it may reasonably be assumed that the thickness of the catalyst layer is constant, a catalyst loading which decreases in the flow direction would mean that the catalyst layer would contain less and less material, and therefore would become progressively less dense. Hence, the pore volume and/or pore size between the catalyst particles would progressively increase. Thus, the subject matter recited in parts (2) and (3) of claims 4 and 5 would be rendered obvious to a skilled artisan. Regarding claim 1, the upstream structure of the catalyst layer would inherently function to prevent drying of the cell, and the downstream structure of the catalyst layer would inherently function to prevent flooding of the cell.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 872-9310 (for non-final communications) or (703) 872-9311 (for after-final communications).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

September 21, 2003

J. Crepeau
JONATHAN CREPEAU
PATENT EXAMINER
ART UNIT 1746